# AN OPHTHALMOLOGICAL SURVEY OF ILLINOIS STATE SCHOOL FOR THE BLIND.

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# AN OPHTHALMOLOGICAL SURVEY OF ILLINOIS STATE SCHOOL FOR THE BLIND

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A. L. Adams, M.D.
JACKSONVILLE, ILLINOIS
R. C. Gamble, M.D., S. R. Gifford, M.D., and H. S. Gradle, M.D.
CHICAGO

This survey of 238 inmates of a state school for the blind showed that 7.5 percent of the children had 20/70 sight or better in the best eye, 17.2 percent had 20/70 to 20/200, and 75.3 percent had less than 20/200. Thus 24.7 percent could be given public-school or sight-saving-class instruction. Sixty-four were recommended for operation and 81 for proper refraction and glasses, with a view to possible further additions to classes not receiving blind education. Recommendations with regard to admission and treatment after admission to the School for the Blind were made.

The great importance of having a uniform and satisfactory definition of blindness and of having proper admission requirements for our schools for the blind is clearly shown by the results of a survey made of all the children in residence at the Jacksonville school in April, 1933. The survey was made at the request of the Board of Public Welfare of the State of Illinois. Inasmuch as these children were in a school for the blind and not inmates of a blind asylum, the educational aspects and the possibilities of visual improvement by medical or surgical means were uppermost in our minds. In each instance it was determined whether the child should be in a blind class, sight-saving class, or in regular school, and in cases where treatment offered some hope of visual improvement, we estimated as accurately as possible which type of instruction should be given, although the final decision, of course, would have to be made after the results of the treatment had been obtained.

Each child was examined, the history on file at the school was noted, the vision recorded, both with and without glasses, the eyes were examined for external diseases and also for fundus conditions, a diagnosis was made, and suggestions as to treatment were made, if there was any possibility of improving the condition. All of the questionable cases were seen in conference by all of the examiners.

The total number examined was 238. The appended table A gives the amount of vision found, and a summary of that table shows that:

> The number of children with vision in the best eye of 20/70 or better was 18 or 7.5 percent.
>
> The number of children with vision in the best eye of between 20/70 and 20/200 was 41 or 17.2 percent.
>
> The number of children with vision in the best eye of less than 20/200 was 179 or 75.3 percent.

The children of the first class should be returned to public school without further argument. The children of the should denote the reactivity of the tissue, consequently an active tissue would have a higher iodin number. In order to reduce, as far as possible, the effects of oxidation, all determinations were made immediately after extraction of the lipids. Brain has the highest iodin number, retina slightly lower, and blood the lowest. The variation between brain and retina is slight, hence a high rate of activity similar to that of the brain is to be expected.

The residue, which is insoluble in alcohol and ether, has not been identified. It perhaps contains hydrolysis and oxidation products of the lipids, salts, carbohydrates, and organic acids.

The percentage composition of all the solids is listed in table 3. It is noted that the blood is low in lipids and high in protein, whereas brain and retina contain approximately equal amounts. This table illustrates the high lipid content of the brain and the low lipid content of blood. There is little correlation between brain and retina.

Table 3

Percentage of solids

| | Retina | Brain | Blood |
|---|---|---|---|
| Protein | 54.5 | 45.5 | 71.5 |
| Total lipids | 31.0 | 51.8 | 4.8 |
| Ether-soluble lipids | 26.4 | 42.0 | 3.0 |
| Kephalin | 3.5 | 8.6 | tr. |
| Lecithin | 8.4 | 9.5 | 0.85 |
| Cholesterol | 2.0 | 8.7 | 0.86 |
| Phospholipids | 10.0 | 22.7 | 1.7 |
| Fat ("unidentified" lipids) | 12.7 | 16.3 | 1.3 |
| Glycolipids | 1.8 | 3.0 | 1.33 |
| Residue | 2.7 | 6.8 | 0.52 |

The figures presented are averages, from which rather great variations occur in different specimens of tissue. Variations also depend upon the length of time between death of the animal and extraction, upon the age of the extract, and upon the care exerted in drying the various extracts. These substances are not stable, consequently it is necessary that all experimental work be done as rapidly as possible. A period of two-to-three days was required to complete an analysis, and those substances which were considered most reactive were determined first. Furthermore the lipids were kept in solution as far as was possible.

## Summary

The percentage composition of the principal organic constituents of the retina, blood, and brain is given. The water content of retina is 10 percent higher than either blood or brain. On the wet basis the proteins vary considerably, with retina 6 percent, brain 10 percent, and blood 15 percent. The total lipid content, on a basis of wet weight, is 11.4 percent in brain, 3.4 percent in retina, and 1.0 percent in blood; i.e., it is much higher in brain than in retina or blood. The composition of the lipids is fairly uniform in the three tissues. Lecithin constitutes a greater part of the total lipids of the retina (27 percent) than it does of blood or brain (18 percent each). Cholesterol forms only 6.5 percent of the retinal lipids, whereas in brain and blood the figures are approximately 17 percent. There is only a trace of kephalin in the blood lipids, however retina contains 11.2 percent and brain 16.6 percent. The glycolipid fraction of retinal and brain lipids is practically the same (5.8 percent), while it constitutes 28 percent of the blood lipids. The "unidentified" fats form a large percentage of the lipids, 41 percent in retina, 31.5 percent in in brain, and 27 percent in blood. The iodin number for retina (22.9) is practically the same as that for brain (24.2) whereas the number for blood is considerably lower (13.4).

second class should be removed from blind education and put into sight-saving classes. The children of the third class belong in a blind school. In other words, 24.7 percent (or 59 in all) of the children instructed by blind methods belonged in sighted classes.

In the appended table B is a classification of the eye conditions according to the diseases found. This is of technical interest rather than practical value, but it leads to the appended table C in which are to be found the recommendations based upon the examinations. Part I of this table contains the recommendations for remedial surgical measures advised. Sixty-four of the children or 26.9 percent could be bettered from the visual standpoint by corrective surgical measures. This does not mean that the entire number of 64 could be returned to the sighted world, as it is impossible to estimate the amount of final vision. However, these children should be given the benefits of modern surgery to improve the visual condition when possible, and it is certain that many of them could be returned to sight-saving classes. Part II of table C shows the number of cases in which improvement of vision could be obtained by proper refracting and fitting with glasses. Whether the improvement would be sufficient to return these children to the sighted world and remove them from blind education cannot be foretold, but certain it is that they should have the benefit of whatever sight is possible in each individual case. These children number eighty-one of the entire School or 34 percent.

From a study of these figures, several facts become apparent. First, 24.7 percent of the children in the School should not be receiving blind education because the amount of vision present in these cases is enough to justify being in public school or sight-saving classes. Their presence in Jacksonville is due to three factors:

A. Laxity in the medical examination before admission to the school,

B. Lack of authority for the attending ophthalmologist to discharge such pupils whose vision is too good for blind education, and

C. Lack of sight-saving classes outside of the larger communities.

Second, 26.9 percent of the children bear the possibility of having their vision improved sufficiently by surgical means to remove them from blind education and restore them to the sighted world. This indicates (a) Lack of proper ophthalmological attention before admission to the School, and (b) Lack of authority on the part of the attending ophthalmologist to remedy such conditions after the children have been admitted.

Third, 34 percent of the children bear the possibility of having their vision improved sufficiently by the proper fitting of glasses to remove them from blind education and restore them to the sighted world. This indicates (a) Lack of proper ophthalmological examination before admission to the School, and (b) Lack of authority for fitting glasses and lack of finances for furnishing glasses within the School.

In view of these facts, we submitted the following recommendations:

1. The establishment of model sight-saving classes in the School for the Blind at Jacksonville, with the understanding that admission to such classes is open only to children whose homes are not within available distance of established sight-saving classes.

2. Blind children and sighted children may be fed and housed together as at present, but should have separate instruction rooms and methods.

3. The visual requirements for admission to the School should be (a) For Blind Instruction: Vision of less than 20/200 in the best eye with correcting glasses; (b) For Sight-Saving Classes: Vision between 20/70 and 20/200 in the best eye with correcting glasses.

4. One of the requirements for admission to the School should be a certificate of a physician licensed to practice in Illinois and registered in the Section of Ophthalmology of the Illinois State Medical Society, stating the diagnosis and condition of each eye and the vision, with and without correcting glasses.

5. The attending ophthalmologist of

the School should be empowered to refuse admission to new applicants whose vision exceeds the limits defined in Section 3. This calls for an examination of all new applicants immediately upon admission.

6. A systematic examination of the entire Blind School population should be made every three years, preferably by a committee of three ophthalmologists.

The remaining recommendations dealt solely with local conditions and are of no general interest.

Thanks to the active interest of the Governor of the State and the active cooperation of the Board of Public Welfare, these recommendations are being carried out. In this way, the blind population of the School has been reduced to those actually requiring blind education and at the same time, visual education has been made possible for the visually handicapped by the establishment of the sight-saving classes available for such children who live in districts that have no such classes.

We believe that this survey has resulted in two benefits:

1. A financial saving to the State of many thousands of dollars per year, and
2. The visual education of many children who in the past would have received their education in the School for the Blind by blind methods or else would have attended public school without sight-saving classes and would have been severely handicapped by their visual weakness.

### Table A

CLASSIFICATION ACCORDING TO VISION

| | |
|---|---|
| Both eyes totally blind | 49 |
| One eye totally blind | 43 |
| Best eye has light perception | 45 |
| Best eye discriminates shadows | 15 |
| Best eye counts fingers | 23 |
| Best eye 1/200 to 20/200 | 47 |
| Best eye 20/200 to 20/70 | 41 |
| Best eye 20/70 to 20/30 | 13 |
| Best eye 20/30 or better | 5 |

### Table B

CLASSIFICATION ACCORDING TO DISEASE

| | |
|---|---|
| Staphyloma | 10 |
| Optic atrophy | |
| Meningitis | 2 |
| Hereditary | 1 |
| Undetermined | 29 |
| Accidents | |
| Perforating injuries | 10 |
| Sympathetic ophthalmia | 9 |
| Glaucoma | |
| Primary | 3 |
| Secondary | 14 |
| Cataracts operable but not operated on | 7 |
| Cataract | 34 |
| Cataract with microphthalmos | 11 |
| Microphthalmos | 9 |
| Choroiditis | 6 |
| Corneal opacity | 21 |
| Interstitial keratitis | 8 |
| Phthisis bulbi | 14 |
| Enucleated both eyeballs | 10 |
| Cerebral blindness | 3 |
| Retinitis pigmentosa | 7 |
| Conical cornea | 1 |
| Retinitis proliferans and vitreous hemorrhage | 2 |
| Retinal degeneration | 8 |
| Xerosis of cornea | 1 |
| Definitely due to ophthalmia neonatorum | 27 |
| Astigmatism | 4 |
| Myopia | 12 |
| Hyperopia | 5 |
| Albinism | 5 |
| Trachoma | 2 |
| Aniridia | 2 |
| Keratoconus | 1 |

### Table C

SUMMARY OF TREATMENT ADVISED

Part I

| | |
|---|---|
| Trephining | 3 |
| Iridectomy | 14 |
| Iridectomy and lens extraction | 4 |
| Enucleation | 4 |
| Capsulotomy | 1 |
| Needling | 34 |
| Iridotomy | 1 |
| Diathermy peritomy | 1 |
| Chalazion removal | 1 |
| Stripping cornea and graft | 1 |
| | 64 |

Part II

| | |
|---|---|
| Refraction | 69 |
| Telescopic Lenses | 11 |
| Contact Glass | 1 |
| | 81 |

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